ChE 4063 Chemical Reactor Design

Required course for ChE program

Catalog Description: Application of the rates of homogeneous and heterogeneous reactions to the design and the engineering evaluation of chemical reactors.

Prerequisites: ChE 3084.

Corequisites: n/a

Prerequisites by Topic: Material and energy balances, fluid mechanics, heat transfer, mass transfer, differential equations (ES 3053, ChE 2003, ES 3003, ES 3073, ChE 3084, Math 3073)

Recent Textbook: Octave Levenspiel's *Chemical Reaction Engineering*, 3rd Edition, John Wiley & Sons (1999)

Other Required Material: None

Course Objectives: At the end of the course, students will be able to

1. Design ideal isothermal reactors, including cases with changes in pressure and density
2. Analyze kinetic data for concentration and temperature dependence
3. Size simple cases of non-isothermal, ideal reactors analytically
4. Size ideal reactors for complex cases using modern computing tools as appropriate including multiple reactions in non-isothermal reactors
5. Explain the principles of catalysis and kinetics of catalytic reactions.

Major Topics Covered in the Course: Conversion and stoichiometric relationships, chemical kinetics, isothermal reactor design, analysis of rate data, non-isothermal reactor design, HYSYS methods, design project , multiple reactions, catalysis and catalytic reactors, diffusion and reaction in porous catalysts, non-ideal reactors.

Class/Laboratory Schedule: Lecture sessions meet for two 75-minute session each week for 14 weeks.

Professional Component Contribution: This is an engineering science/design course.